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MERGER AS A RESPONSE TO ORGANIZATIONAL INTERDEPENDENCE

**Jeffrey Pfeffer
University of Illinois**

#49

**College of Commerce and Business Administration
University of Illinois at Urbana-Champaign**

FACULTY WORKING PAPERS

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April 24, 1972

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Urbana, Illinois 61801

April 20, 1972

MEMORANDUM FOR THE DIRECTOR OF THE UNIVERSITY OF ILLINOIS

RE: A REPORT TO THE UNIVERSITY OF ILLINOIS

INTERPRETING

John J. ...

University of Illinois

Urbana, Illinois

cc:

443

ABSTRACT

Merger is examined as one possible strategy for an organization to employ in managing environmental interdependence. Three types of merger are identified: 1) merger to reduce symbiotic interdependence; 2) merger to reduce commensalistic or competitive interdependence; and 3) merger to diversify, and avoid previous interdependencies. Patterns of industrial merger behavior are examined, and it is seen that there is a strong association between patterns of resource exchange and patterns of merger activity. Competitive mergers, and diversification are also considered, and it is seen that the analysis of merger activity also permits explanation of variations in the profitability of acquired firms prior to acquisition.

ABSTRACT

Market is examined as one possible strategy for an organization to employ in managing environmental interdependence. Three types of market are identified: 1) market to reduce systematic interdependence; 2) market to reduce commercial or competitive interdependence; and 3) market to diversify, and avoid previous interdependencies. Patterns of industrial market behavior are examined, and it is found that there is a strong relationship between patterns of resource exchange and patterns of market activity. Competitive markets, and diversification are also considered, and it is seen that the analysis of market activity also provides explanation of variations in the profitability of acquired firms prior to acquisition.

MERGER AS A RESPONSE TO ORGANIZATIONAL INTERDEPENDENCE

The operations and decisions of organizations are inextricably bound up with the conditions of their relevant environments. Cyert and March (1963), in their simulation of a duopoly, trace the mutual adjustment of one organization to the other one, and as part of their behavioral theory of the firm, note that organizations attempt to establish a negotiated environment. Hazard (1961) has also commented on the fact that businessmen, at least, seek certainty, and how this is incompatible with some of the requirements of the anti-trust laws. The impact of the environment on the organization has been widely noted (Thompson and McEwen, 1958; Katz and Kahn, 1966; Buckley, 1967; Evan, 1966; Dill, 1958; Thompson, 1967). Thompson (1967, Ch. 3) has postulated that organizations attempt to manage their external dependencies, or to control the relevant environment. Writing from an open systems perspective also, Hawley (1950) recognized the tendency for organisms to attempt to control their environments, and he suggested that they employed a growth strategy. Katz and Kahn (1966) speak of a growth dynamic, and relate this to the organization's requirements for certainty and survival, which are postulated to be enhanced through growth. And Starbuck (1965) has also proposed that organizations operate on their environments to make them more munificent.

We have, then, three distinct issues. First, there are the propositions by Thompson, Cyert and March, Katz and Kahn and Starbuck (among others) that organizations take actions to control or manage their environments, or at least their dependency on the environment. Secondly,

there appears in the literature on organizations the pervasive theme of the objective of growth. It can be seen (Katz and Kahn, 1966; Hawley, 1950) that growth is one mechanism for dealing with the environment. However, there are other mechanisms for managing environmental dependency, and also, there may be other motivations for organizational growth (c.f., Starbuck 1965). Finally, there is the issue of how to grow--internally, or through merger, and also the simultaneous question of which areas in the environment to expand into.

This paper presents some empirical evidence on patterns of industrial merger activity. The evidence is not inconsistent with the conceptualization of organizations attempting to manage their dependence on the environment. However, the evidence is also not inconsistent with many of the other motivations for organizational growth, and being confined to the topic of merger, provides no guidelines as to when one strategy for dealing with the environment will be used rather than another. Yet in focusing on the question of where growth occurs, we are able to present some data which explore this unexamined issue, and also are able to provide some support to a theoretical schema that can assist us in systematically exploring the issues which have been raised in the literature on organizational growth and management of the environment.

Strategies for Managing the Organization's Environment

If organizations do seek to manage their environments, to reduce uncertainty, and to make them more munificent, there are several strategies that may be employed. One is the strategy of co-optation, discussed by

Selznick (1949) in his case study of the Tennessee Valley Authority. Selznick realized that organizations must come to terms with their environments, and illustrated how co-optation was one mechanism of accomplishing this accommodation. Selznick saw co-optation as a dilemma, however. For in coming to terms with the environment by absorbing representatives of powerful groups onto the organization's governing boards, the very real possibility was raised that the organization's original objectives might be diverted. In fact, his study of the TVA demonstrates how a very liberal, new deal organization, in meeting the threats of local conservative agrarian groups, did in fact alter some of its objectives and operations. While the dilemma of central planning versus local participation is a prominent theme in the work, the organization's accommodation with the local environment through the strategy of co-optation is of particular importance to organization theory.

Zald (1967) related the composition of YMCA boards of directors in Chicago to variations in the geographic location, and studied the consequences for some measures of board effectiveness. He noted that the recruitment of board members had both a supply and a demand component. Community agencies, recruiting from the areas in which they were located, might encounter problems in locating a supply of high wealth, high prestige individuals to place on the board. Again there is observed the correspondence between the environment and the composition of the board of directors.

In addition to co-optation, long-term contracts may be used to stabilize relations among organizations, and to eliminate some of the environmental uncertainty (cf. Guetzkow, 1966). And, as Macaulay (1963)

has observed, there are many important non-contractual relations among businesses, which may also serve to govern and stabilize interorganizational relations. Guetzkow (1966) has hypothesized that more formal arrangements may grow out of informal interorganizational interactions which have been found to be mutually satisfying. Perrow (1970) has provided some case examples which illustrate the importance of business norms and values as providing limits on behavior, and thus reducing uncertainty in the organization's environment. Thus, in addition to co-optation, long-term contracts and social values and norms may operate to stabilize interorganizational relationships, and reduce the environmental uncertainty. Of course, there are also mechanisms of illegal collaboration, such as price-fixing cartels and conspiracies. While these are obviously more difficult to study directly, an illustration of the analysis of cartel behavior is to be found in MacAvoy's (1965) empirical work on the railroad cartel operating out of Chicago in the late 1800's. Pinfield, et al. (1970) have reviewed many of the arrangements possible for mediating interorganizational relations, and Litwak and Hylton (1962) have studied the development of coordinating agencies with particular emphasis on the United Fund.

The joint venture is yet another vehicle for interorganizational relationships. Aiken and Hage (1968) studied the use of joint ventures among community agencies, and postulated that the joint venture served the objective of providing additional resources for program development while simultaneously maintaining the autonomy of the parent organization.

The organization may attempt to use the power of the state to obtain more favorable conditions in the environment. Stigler (1971) has noted that the state can provide an organization with direct cash subsidies, restriction of entry by competition, control over factors which affect substitutes and complements, and the ability to legally fix prices. Organizations have long attempted to obtain favorable conditions through political means (cf. Bauer, et al., 1963; Hall, 1969). Zald (1970) has identified two types of environments--political and economic. It is not at all unreasonable to expect that organizations will use strength or power developed in one environment to obtain more favorable conditions in the other environment. There are many examples of the attempts to employ political means to obtain more favorable economic conditions, such as through the use of tariffs and import quotas.

Finally, there exists the possibility for organizations to deal with uncertainty or interdependence by absorbing it completely, through merger. Companies may employ merger as a means for integration, by merging either forward or backward in the production process. This is an attempt to deal with symbiotic interdependence (Hawley 1950)¹. Steel companies may merge with coal producers, and oil companies may purchase systems of petroleum distribution. Paper companies may buy lumber companies, or textile firms may purchase fabric stores. Secondly, companies may purchase the competition as a way of reducing competitive, or commensalistic interdependence. While this has been somewhat prevented by the anti-trust laws, there are nevertheless a large number of horizontal mergers, or mergers between

similar types of companies, each year. Finally, a firm may attempt to handle interdependence through a merger or growth strategy of diversification. If a firm is too dependent upon a portion of the environment for absorbing its output, or for providing an important input, it may diversify into other product or service areas, and thereby hopefully reduce its dependence on the portions of the environment with which it previously dealt. The attempted diversification efforts of many of the aerospace companies provide examples of this strategy in operation.

Warren (1967) has summarized much of the discussion on interorganizational coordination, noting that the specific means used may vary as conditions in the interorganizational field vary. Also, he has developed a typology of joint decision making, arranged along a dimension of inclusiveness, and varying from the merged, or unitary organization, through coalitional and confederative forms of interaction, to the mechanism of social choice as an interorganizational decision-making method.

Merger, then, is just one possible strategy for managing the organization's dependence with the environment. Merger may be pursued for objectives of growth, of course, and growth per se may be part of a strategy of dealing with the environment. The intertwining of these issues make conclusive resolution impossible until additional empirical evidence is presented. The contribution of the empirical work reported here is to provide some evidence of merger behavior which is consistent and compatible with the conceptualization of merger as a response to organizational interdependence. Before getting to this evidence, however, we will review some other treatments of the merger phenomenon to determine what previous research has discovered.

Merger Research

While mergers occur between governmental units, social service agencies, hospitals (cf. Starkweather, 1971), and many other organizations, the merger of business organizations has been the topic that has been the most extensively treated. This is partially because mergers among economic organizations are recorded by the Federal Trade Commission, which provides a ready and accessible source of data. The difficulty is, however, that theories of merger have been developed primarily by economists, which means that they are primarily relevant for economic organizations. This has led to only a relatively few, focused questions being asked, and to a neglect of the development of a theory of merger which is generalizable across types of organizations. Note that Thompson, Katz and Kahn, and Starbuck have stated that organizations seek to manage their environments, or make them more certain--not just business organizations. There is probably a great deal to be learned, in fact, by comparing the merger behavior of organizational types, but that task must await the development of better data bases as well as more advanced theoretical conceptualizations.

The economists have essentially asked two questions--when do mergers occur, and why do mergers occur. Nelson (1959) in a study of the episodic nature of the occurrence of mergers, came to the conclusion that mergers occur at times of favorable conditions in the capital markets. He writes, "Empirical investigations of such factors as the rate of industrial growth, the rise of technological innovation, and the growth of interregional transportation indicate that they were not likely to have been important immediate factors in the merger wave....Peaks in the expansion of merger activity were found to be closest in timing to those in industrial stock prices, stock market trading and new business incorporations" (pp. 6-7).

Gort (1969) felt that mergers occurred because of discrepancies in evaluations of the firm between the selling and the buying parties. These discrepancies, he believed, were more likely to exist in times of rapid technological change, and when there were speculative capital markets. Gort stated that "forces which generate discrepancies in valuation are decisive in determining variations in merger rates both among industries and over time" (p. 624). In an analysis carried out on Federal Trade Commission data covering the period 1951 through 1959, Gort found that the technical personnel ratio, productivity change, growth, and the concentration ratio were each correlated with the merger rate.

Most analyses of merger behavior have attempted to demonstrate that merger-active firms either were more profitable or were not more profitable than firms that did not engage in as much merger activity. If the goal of profit maximization, common in economic theory, is assumed, then the issue of whether or not mergers enhance profitability becomes a central one. Dewing (1921) analyzed 35 consolidations, and found that earnings diminished after the consolidation, and had, moreover, been grossly overestimated before the consolidation occurred. Livermore (1935), in a study of 328 firms which had merged during the period 1890-1904, found that successful mergers accounted for less than 50% of the total. Reid (1962) studied some 66 firms during the period 1950-1959, and found that the highest percentage of very successful firms was in the group not involved in acquisitions. Kelley (1967), working with a relatively limited sample of firms, concluded that active acquirers were neither more nor less profitable than other comparable firms in their industry. Reid (1968), exploring the possible motives for merger, has provided some evidence that mergers are made for growth

objectives, and that merger-active firms are actually less profitable than others in the same industry. Mueller (1969) has also hypothesized that mergers are made for growth. Finally, Hogarty (1970), studying 43 firms and utilizing stock market price as a measure of merger success, also was forced to conclude that merger active firms were at least not superior to those who were not active, as measured by increases in the value of their common stock.

After at least fifty years of research, it seems that if mergers are made to increase profitability or share price, they are not particularly successful in doing so. This may be because the price of good companies to be acquired is high enough so that no post-merger excess profits can be realized. In any event, no study has examined the pattern of merger behavior, or which companies are acquired by whom in mergers, though Gort (1969) did analyze the type of company doing the acquiring. We shall hypothesize, following Cyert and March (1963), Thompson (1967), Katz and Kahn (1966), and Starbuck (1965), that mergers are an attempt on the part of organizations to reduce uncertainty and manage their environments. This perspective is generalizable across organizational types, consistent with the results, or lack thereof, of the literature cited, and focuses attention on patterns of merger activity, in which both the acquired and acquiring firms are analyzed. The evidence consistent with this hypothesis is presented below.

Patterns of Merger Activity

The merger data utilized in this study were drawn from the Federal Trade Commission's Report on Large Mergers in Manufacturing and Mining, 1948-1969

(Federal Trade Commission, 1970). Mergers of manufacturing companies with other manufacturing companies were analyzed, with the exception that mergers of petroleum refiners with producers of natural gas and crude oil were included. The data included a total of 854 mergers, representing the acquisition of some \$44.9 billion in assets over the period.²

We have hypothesized that mergers are organizational responses to environmental interdependence. While there are many resources of concern to organizations, we have focused the analysis on resources that are exchanged for money. Levine and White (1961) have developed the concept of exchange as a means of analyzing interorganizational behavior. The measures of resource interdependence we employed were derived from Leontief's (1966) input-output tables, showing transactions among sectors of the economy. Resource exchange measured in these terms permits a test of the hypothesis which states that mergers will tend to be with organizations with which the given focal organization is relatively more interdependent. Using interdependence data on this aggregate level, of course, requires a comparable aggregation of the merger data. Therefore, the analysis to be presented is based on a classification of merger by the 20 two-digit Standard Industrial Code classifications. Clearly, one extension of the present analysis would be to obtain company by company transactions data, and to conduct the analysis on this basis.

The classification of both acquired and acquiring company as to their role in the merger, and by industrial sector is done by the Federal Trade Commission. While there are probably errors and difficulties in the classification, these are unrelated to the specific study to the extent that these judgments are not made by the author.

Two matrices were constructed representing patterns of merger activity--one based on the number of mergers, the other based on the assets involved. In these tables, the horizontal row represented the acquiring industry, and the column the industry of the company that was acquired. The raw data were converted into percentage terms, so that each table read across as the percentage (by number or assets) of acquisitions made by industry x that were with industry y.³

Considering the Leontief input-output tables, three measures of resource interdependency were defined. On a comparable two-digit manufacturing industry basis, we derived measures of 1) the percentage of an industry's output sold to a given other industry; 2) the percentage of an industry's input purchased from another manufacturing industry; and 3) the percentage of the industry's total transactions that occurred with a given other industry.⁴

Based upon the conceptualization of merger as absorption behavior occurring in response to conditions of organizational interdependence, we can propose the following relationships:

Let

x_{ij} = the percentage of the total number of mergers of industry i that were with industry j

x'_{ij} = the percentage of the total assets acquired by industry i that were in industry j

t_{ij} = the percentage of industry i's sales made to industry j

t'_{ij} = the percentage of industry i's purchases made from industry j

tt_{ij} = the percentage of industry i's total transactions that are with industry j.

Then, we have hypothesized that

$$x_{ij} = a + b_1 t_{ij} + b_2 t'_{ij} + b_3 tt_{ij} + u \quad (1)$$

$$x'_{ij} = a' + b'_1 t_{ij} + b'_2 t'_{ij} + b'_3 tt_{ij} + u \quad (2)$$

where u is a random disturbance term. We are not, a priori certain which measure of resource interdependency is most responsible for merger behavior.

We shall also consider three alternative hypotheses to the notion that merger is a response to resource interdependence. The first is that mergers occur on a random basis. Because there are differing numbers of large firms in different industries, the observed patterns of merger behavior would not be equal across industries even if mergers were occurring randomly. In other words, the supply of potential merger candidates large enough to be reported in the FTC series differs across industries. Data on the number of firms with assets over \$10 million were collected from the Internal Revenue Service Statistics of Income for several different years. Because of the high correlation between the figures for different years, we chose one year, 1958, as the year from which data would be collected for the analysis. This year is approximately at the mid-point of the time period being considered. The variable n_j , or the number of firms in industry j , was then introduced as a controlling factor in the analysis.

A second alternative is that profitable industries are likely to attract firms interested in acquisitions. Industry profitability, in terms of the rate of return earned on equity, was included as a controlling factor. We denote the profitability of industry j by p_j .

Finally, the concentration, as measured by Weiss (1963) for each industry was employed as an alternative variable. It was thought that concentration might be a surrogate for difficulty of entry into an industry, and that the variable also reflected important characteristics of industrial structure. The concentration measure is denoted by c_j .

Analysis of the Merger Data

The results of the analysis of merger as a correlate of organizational interdependence are quite striking. Considering all manufacturing industries at once, the following simple correlations were observed.

	t_{ij}	t'_{ij}	tt_{ij}	p_j	n_j	c_j
x_{ij}	.65	.62	.66	.01	.16	.01
x'_{ij}	.59	.52	.57	.03	.21	.04

The Pearson correlations with all of the transactions measures for either the number of mergers or the assets merged were significant at less than the .001 level, while correlations with either the profit rate variable or the concentration ratio were not significant. The correlation with the number of firms in the industry in which the acquisition was made was significant at less than the .01 level, but the magnitude of the correlation is significantly less than those for the transaction variables.⁵

As defined, tt_{ij} is highly correlated with the other two transactions variables, t_{ij} and t'_{ij} . However, it turns out that these two variables are also highly correlated with each other, or the percentage of an industry's sales to a given other industry is highly correlated with its purchases from that industry. In fact, t_{ij} is correlated .67 with t'_{ij} , and .88 with tt_{ij} , while t'_{ij} is correlated .93 with tt_{ij} . Utilizing a step-wise regression analysis of x_{ij} , the percentage of mergers by number that were with a given industry, t_{ij} alone accounts for 41.8% of the variance, while adding t'_{ij} accounts for an additional 5.9%, and the further addition of tt_{ij} accounts for only an additional 1.5% of the variance. If we are only interested in the total predictive value of the transactions variables, we can disregard the issue of multi-collinearity, and note that the three variables together account for 49.2% of the variance in x_{ij} . Looking next at x'_{ij} , or the percentage of mergers by assets that were acquired by industry i in industry j, a stepwise regression analysis indicates that t_{ij} alone accounts for 35% of the variance while the addition of t'_{ij} accounts for an additional 2.8% of the variance and the addition of tt_{ij} accounts for a further 1.6% of the variation. The three variables together account for 39.4% of the variation in x'_{ij} .

For 18 of the manufacturing industries in which there were enough total mergers to make the results meaningful, we can present data showing how strongly correlated the transactions measures were with the observed patterns of merger behavior, and also the correlations with the other three variables. These results are presented in Tables 1 and 2. Table 1 presents the results for the analysis of the percentage of mergers by number, while Table 2 presents the analysis for the percentage of assets acquired in the various industries.

Table 1 about here

Table 2 about here

In virtually all cases, there are statistically significant correlations with at least one measure of resource interdependence, and in every case, or in 108 instances in the two tables, the correlations are in the expected positive direction. None of the other variables do nearly as well in explaining patterns of merger behavior on an industry by industry basis. If we take the arithmetic average of the correlations over the 18 industries between x_{ij} and x'_{ij} and the various factors considered, we can develop the following table.

	t_{ij}	t'_{ij}	tt_{ij}	p_j	n_j	c_j
x_{ij}	.75	.71	.77	.04	.19	.02
x'_{ij}	.70	.65	.71	.06	.24	.05

where t_{ij} is the percentage of industry i's sales made to industry j, t'_{ij} is

the percentage of industry i 's purchases made from industry j , tt_{ij} is the percentage of industry i 's total transactions with industry j , p_j is the profit rate of industry j , n_j is the number of large firms in industry j , c_j is the concentration of industry j , x_{ij} is the percentage of mergers by number of industry i with industry j , and x'_{ij} is the percentage of industry i 's acquisitions by total assets that were with industry j .

Mergers Within the Same Industry

When we consider only mergers within the same two-digit Standard Industrial Code category,⁶ the model is put to its severest test. First of all, firms tend to have relatively more transactions within the same industry, and have also tended to merge relatively more frequently with other firms in the same industry. Therefore, it is possible that this clustering of data points is spurious, and has produced artificially good results.

There is also the alternative that mergers occur based upon information or patterns of familiarity with the operations of the industry in which the acquisition is being made. Interdependence, in the sense of resource exchange, can certainly tend to increase familiarity between the exchange partners, and to that extent, it is impossible to separate the effects of familiarity from the effects of transactions interdependence. However, in considering only mergers within the same industry, we can more plausibly assume a constant degree of familiarity within each industry. Differences in within-industry merger rates can then more confidently be attributed to variables other than familiarity.

The correlations between the measures of merger patterns and the resource interdependency measures, as well as the control variables, for the 20 data points representing mergers within the same SIC, are presented below:

	t_{ij}	t'_{ij}	tt_{ij}	p_j	n_j	c_j
x_{ij}	.22	.46*	.36*	-.30	.38*	-.14
x'_{ij}	.35*	.33*	.34*	-.17	.42*	-.06

The asterisk again represents statistical significance at less than the .05 level. While n_j is significant and in the expected direction, n_j is not correlated with any of the resource interdependence measures, and hence their significance is maintained when combined with n_j in a multiple regression analysis. Measures of resource interdependency are important in analyzing differences in the percentage of mergers that occur within the same two-digit industry group. Five of the six correlations are significant at the .05 level and all are in the expected direction.

In considering mergers within the same industry group, we are studying mergers that may be occurring to reduce either symbiotic interdependence, or competitive or commensalistic interdependence. We would expect the relationship between economic concentration and the reduction of competitive uncertainty to follow an inverted U-shaped relationship. At very low levels of industrial concentration, there are many firms active in the market, and there is no small group of them that truly dominate the environment. Merger under these conditions reduces uncertainty very little, because any given firm accounts for so small a proportion of the competition. On the other hand, at very high levels of concentration, a great proportion of the industry's output is in the control

of a few large firms. Under these circumstances, uncertainty can, perhaps, be reduced through tactics such as price leadership or other forms of inter-firm communication, because the behavior of only a few major competitors must be monitored and predicted. Stigler (1964) analyzed oligopoly behavior based on information theoretic considerations. He noted that with very few firms, the probability of detection of deviations from standard industry practice would be much greater. Furthermore, as concentration in the industry increases, prohibitions against horizontal mergers are more likely to be vigorously enforced, which would again contribute to a decline in the number of mergers within the same industrial category.

From a graphical analysis, it was determined that a value of approximately 40% for the concentration ratio appeared to be the peak of the inverted U. Therefore, a variable representing the absolute value of the industry's concentration less 40% was defined, and related to the percentage of merger activity occurring within the same two-digit SIC. This variable, difcon_j , was correlated $-.38$ with x_{ij} , and $-.39$ with x'_{ij} , both correlations in the expected direction statistically significant at the .05 level. While this variable was uncorrelated with any of the measures of resource interdependence, it was highly correlated with the number of firms, n_j . This correlation explains the previously reported significant correlations for this control variable.

When the two independent measures of resource exchange, t_{ij} and t'_{ij} , and difcon_j are combined in a single regression equation, 37.8% of the variance in the percentage of number of mergers within the same industry classification, and 35% of the variance in the percentage of assets acquired within the same industry can be explained.

Diversification

In our earlier discussion of merger as a strategy for dealing with organizational dependence on the environment, we noted that there were three types of mergers that were relevant: 1) mergers to absorb symbiotic interdependence, or mergers for vertical integration; 2) mergers to absorb commensalistic interdependence, or horizontal mergers to absorb some of the competition; and 3) mergers for diversification, or mergers to avoid either type of interdependence by diversifying the activities of the organization.⁷ Having now discussed some evidence on the first two types, it remains to consider some evidence on diversification.

Diversification is a strategy for avoiding interdependence, and is likely to be utilized when due to either monetary or statutory constraints, absorption of the external interdependence is not possible. Diversification, then, will also be systematically related to the percentage of resources exchanged with some important external organization. If there is no interdependence, there is no need for diversification. The one organization that would most clearly meet all the conditions hypothesized to generate an avoidance strategy for managing dependence is the government. The government can not be absorbed, and co-optation does not eliminate the threat of changes in the levels of appropriations. We would therefore postulate that firms, or industries, which did a great deal of business with the government, would engage more frequently in diversification for reducing interdependence.

Gort (1962) has studied diversification and integration in American industry, and has developed an index of the extent of diversification for 13 manufacturing industries. Correlating these index numbers with the percentage of business done with the Federal government, and with governments on all levels, we obtained the following results. The percentage of business done with the government was correlated $-.55$ with the percentage of business done within the same industrial category, a result which is statistically significant at the $.03$ level with the small sample size being used. And, the extent of diversification was correlated $.58$ with the percentage of business done with the Federal government, a result which is significant at the $.02$ level. What this means is that diversification, measured by the extent to which the firm's business is done with products outside of those in its primary classification, is positively related to the percentage of business done with the government, as determined on the industry level of analysis. Industries that do relatively more of their business with the government tend to have higher measures of diversification, or sell a lower proportion of products in the primary industrial group.

To the extent, then, that diversification is prompted by doing a large percentage of business with the government, we should be able to account for the variation in the correlation coefficients obtained when we predicted merger behavior based on an absorption strategy for reducing interdependence. To the extent that industries doing a large percentage of their business with the Federal government were merging not to absorb interdependence, but to diversify away product market interdependence,

correlations in these industries should be relatively lower. When the transactions correlation coefficients themselves were correlated with the percentage of business done with both the Federal government and with government in total, the results were consistently in the expected direction, but were not significant, partially because the sample size was limited to the 18 industries being studied. Of the twelve possible correlations (each of the three transaction interdependence measures with each of the two percentage sales measures), ten were in the expected negative direction, meaning the more business that was done with the Federal government, the less well the model that accounted for only the absorption strategy worked in explaining merger behavior.

Profitability of Acquired Firms

Finally, we can consider the profitability of the acquired firm, in the year prior to acquisition, and determine whether the conceptualization of merger as a response to organizational interdependence can assist in analyzing these data. The Federal Trade Commission has published profitability levels of companies acquired in various types of acquisitions (Federal Trade Commission, 1969), for those cases where the assets of the acquired company were \$25 million or more. The table covers mergers in manufacturing and mining for the years 1950-1968, and represents data from 401 mergers. Based upon our conceptualization of merger as either part of an absorption or an avoidance strategy, we can make some predictions about the profitability of mergers undertaken for either of the two reasons.

We have identified two reasons to merge. One reason for merging is to reduce resource interdependence by absorbing that interdependence, either by

acquiring competitors who are fighting for similar resources or markets, or by acquiring suppliers and customers who are vertically related to the organization in the input and output exchange relationships. The second reason for merging is to reduce interdependence by diversifying into other activities, so that the organization's reliance on a particular set of organizations in its environment is reduced. While organizations probably do desire to acquire profitable ventures, other things being equal, we can see in operation a set-defining search rule. If a firm is merging under the absorption strategy, the set of firms in which it can make its acquisition is, by definition, limited to those in resource areas with which the firm is interdependent. On the other hand, diversification permits inclusion in the considered set of many other firms besides those which are interdependent in a resource exchange sense with the focal organization. It is not unreasonable to expect, then, that strategies of diversification will permit the inclusion of more potential merger candidates. And as a consequence of the larger set of considered alternatives, diversification mergers will tend to be with firms that are more profitable prior to the acquisition.

In Table 3 we have reduced the Federal Trade Commission data to show the rate of return earned by two sets of acquired companies-- those acquired

Table 3 about here

in horizontal or vertical mergers, which are mergers for absorption, and those other mergers, made for diversification. An analysis of the table using a Chi-square contingency analysis confirms at the .02 level of significance that we are forced to reject the null hypothesis that the profitability of firms acquired for absorption is equivalent to that of firms

acquired for diversification. Inspection of the results indicates that they are in the predicted direction.

Conclusion

The pattern of mergers among industrial companies has been analyzed as a response to organizational interdependence. It has been shown that there exist statistically significant associations between patterns of resource exchange and patterns of merger activity, and that these associations are able to account for about one-half of the variation in merger behavior. Merger, when conceived as a response to organizational interdependence, is then a strategy to be examined along with other strategies that can be utilized in managing the organization's environment, and also is a strategy that can be analyzed in a consistent conceptual framework across types of organizations.

We have specified three types of merger behavior: 1) merger to absorb symbiotic interdependence; 2) merger to absorb competitive or commensalistic interdependence; and 3) merger for diversification, or merger to avoid existing interdependencies by reducing them. Data on all three types of merger behavior have been examined, and by following this mode of analysis, we have even been able to partially account for observed variations in the strength of our correlational results. The confidence in the conceptual schema developed is thereby strengthened, because not only can it explain a significant amount of the variation in merger behavior, but it can even be employed to predict when it will work well or poorly in the job of explanation.

As we have stressed throughout, merger is only one form of organizational linkage, and is at one end of Warren's (1967) continuum of inclusiveness.

The task remains to relate the various strategies for managing the environment to each other over time, and to conditions in the interorganizational environment that might explain the use of one rather than another. The task also remains to examine growth, apart from merger, as a strategy for managing the environment, and to specify the environmental conditions that will tend to produce strategies of diversification or integration.

FOOTNOTES

- ¹The concept of symbiosis has been defined in the human ecology literature as "a mutual dependence between unlike organisms" (Hawley, 1950, p. 36).
- ²During the period studied, there were 1,417 total mergers in manufacturing and mining involving firms with assets of over \$10 million. These mergers accomplished the acquisition of \$63.7 billion in assets. However, there are many other types of mergers not covered either by the particular FTC report, or by the study. There are mergers that are large and involve companies in industries besides mining and manufacturing such as retailing the services, or finance. And, there are the many smaller mergers that occur.
- ³These tables are available upon request.
- ⁴These tables are available upon request.
- ⁵These particular correlations are higher for a simple linear correlation than for correlations on various non-linear transformations of the variables, though in no case is the difference particularly large. As the theoretical basis for the study has only predicted a relationship, without specifying shape, it is interesting to note that a simple linear fit provides the best results for these data.
- ⁶During the period studied, there were 373 mergers between firms that were in the same 2-digit industry classification.
- ⁷According to the Federal Trade Commission (1970), approximately 16.1% of the total number of mergers in mining and manufacturing during this period were of a horizontal variety, or were likely to be for the purposes of reducing commensalistic interdependence; 13.3% of the mergers were vertical, or to absorb symbiotic interdependence; and 70.7% of the mergers were classified as conglomerate, or as tending to further diversification. This classification is both arbitrary, and not relevant to the analysis undertaken in this paper, however. The fact that transactions interdependence, which is a symbiotic relationship, accounted for so much of the variation, provides some evidence that there is considerably less conglomeration than is customarily believed.

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Table 1

Correlations of x_{ij} (percentage of total
mergers of industry i with industry j) with
Transactions and Other Variables for Separate
Manufacturing Industries

Industry	t_{ij}	t'_{ij}	tt_{ij}	p_j	n_j	c_j
Food	.98**	.95**	.97**	-.13	.56**	.00
Textile	.67**	.94**	.86**	-.52	.07	-.26
Apparel	.93**	.74**	.91**	-.72	-.18	-.46*
Lumber	.76**	.60**	.69**	.09	-.05	-.35*
Paper	.86**	.98**	.96**	.13	.12	-.10
Printing	.98**	.53**	.78**	.20	.03	-.16
Chemicals	.96**	.98**	.97**	.28	.38*	.24
Petroleum	.68**	.73**	.82**	.03	.01	.20
Rubber	.32	.22	.36*	.26	.16	.37
Leather	.88**	.86**	.88**	-.73	-.36	-.38*
Stone, Clay, and Glass	.80**	.95**	.95**	.30	.25	.22
Primary Metals	.81**	.99**	.95**	.07	.33	.31
Fabricated Metals	.46*	.15	.31	.29	.49**	-.01
Machinery	.96**	.78**	.91**	.24	.52**	.08
Electrical Machinery	.91**	.85**	.93**	.29	.39*	.20
Transportation Equipment	.61**	.63**	.63**	.34	.46*	.36
Instruments	.61**	.56**	.67**	.21	.21	.14
Miscellaneous Manufacturing	.31	.29	.38*	.04	-.07	-.10

* represents significance at less than the .05 level in the expected direction

** represents significance at less than the .01 level in the expected direction

Table 2
Correlations of x'_{ij} (percentage of total assets
acquired by industry i that were in industry j)
with Transactions and Other Variables for Separate
Manufacturing Industries

Industry	t_{ij}	t'_{ij}	tt_{ij}	p_j	n_j	c_j
Food	.98**	.96**	.98**	-.11	.60**	.00
Textile	.64**	.78**	.78**	-.58	.28	-.27
Apparel	.86**	.86**	.97**	-.74	-.14	-.46*
Lumber	.44*	.24	.34	.11	.04	-.19
Paper	.81**	.95**	.92**	.12	.16	-.00
Printing	.97**	.52**	.77**	.18	.01	-.18
Chemicals	.91**	.96**	.94**	.31	.38*	.29
Petroleum	.86**	.31	.43*	.22	-.02	.31
Rubber	.19	.34	.40*	.24	.43*	.42
Leather	.91**	.88**	.90**	-.70	-.36	-.36
Stone, Clay, and Glass	.64**	.90**	.83**	.32	.35*	.21
Primary Metals	.78**	.98**	.93**	.08	.35*	.32
Fabricated Metals	.48*	.03	.22	.31	.44*	.05
Machinery	.95**	.77**	.90**	.28	.58**	.16
Electrical Machinery	.92**	.77**	.90**	.30	.46*	.18
Transportation Equipment	.73**	.83**	.80**	.34	.46*	.36
Instruments	.48*	.27	.44*	.22	.37*	.07
Miscellaneous Manufacturing	.08	.29	.26	.16	-.02	.00

* represents significance at less than the .05 level in the expected direction

** represents significance at less than the .01 level in the expected direction

Table 3

Profitability of Acquired Companies, Asset
Size of \$25 Million or More, in the Year
Prior to Acquisition, 1950-1968

Profitability (rate of return on equity)	Horizontal and Vertical Mergers	Conglomerate and Product Extension
20% and over	6 companies	13 companies
15% - 20%	12	44
10% - 15%	38	92
5% - 10%	45	83
0% - 5%	21	31
Not profitable	11	5
Total companies	133	268

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